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AUTHOR Schallert, William F.
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ABSTRACT

Florissant Valley Community College has integrated Engineering Technology education into a comprehensive community college setting. Problems of implementation and some of this institution's means of solving them are presented as a case study. The history of the institution is presented to include information about the staff and the initial programs as well as the problems. (Author/EB)

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IMPLEMENTATION OF ENGINEERING TECHNOLOGY IN THE COMPREHENSIVE COMMUNITY COLLEGE

William F. Schallert
Professor and Chairman
Engineering Division
Florissant Valley Community College
Ferguson, Missouri 63135

Abstract

Florissant Valley Community College has integrated Engineering Technology education into a comprehensive community college setting. Problems of implementation and some of this institution's means of solving them are presented as a case study.

SE 020 338

INTRODUCTION

It is a pleasure to talk about the implementation of Engineering Technology in the Community Junior College. In particular, I will talk about this process in a specific college: Florissant Valley Community College in St. Louis. I will try to present the development of this specific case in the framework of the rather dynamic development of community colleges in the United States.

While the Junior College had its beginning in the early part of this century, it has only been in recent years that large numbers of students have flocked to this type of institution. Early Junior Colleges were formed primarily to provide the first two years of a college or university education and only in the past fifteen to twenty years has technical education in this type of institution grown substantially. Further, many types of technical or career programs have been generated with some confusion as to identity.

THE COMPREHENSIVE COMMUNITY COLLEGE

The Comprehensive Community Junior College is one of the most recent developments in higher education. The institution we are talking about is a "college" in that it offers post-secondary programs of instruction. It is a "Junior" College in that it provides less than four year programs. "Community" in its title indicates

emphasis on programs directed to the local population, business, and industry. Finally, "Comprehensive" indicates an institution that provides curricula covering a large range of community interests and needs.

THE INSTITUTION AND HISTORY

Florissant Valley Community College was founded with this comprehensive nature specified. It is one of the three community colleges forming the Junior College District in St. Louis and St. Louis County.

The JCD was created in 1962 to serve an area of 550 square miles with a population of 1,500,000 and an assessed valuation of 3.5 billion. Included in this area are 28 public high school districts. The District had a student body of 2,386 in the fall of 1963 and reached an enrollment of over 20,000 in the fall of 1973.

Each of the three colleges was formulated under the same educational philosophy and much of what will be presented here applies to the other two colleges, Meramec Community College and Forest Park Community College. In the process of development, each college concentrated on specific areas of technical or career education. Florissant Valley was given the role of developing Engineering and Industrial related curricula.

THE COMMUNITY, COLLEGE, AND ENGINEERING DIVISION

Florissant Valley Community College is located in a large metropolitan area with a diverse range of large and small industry.

Programs related to engineering and industry were assigned to the Engineering Division. It is one of eight divisions and is divided into five departments: Electrical, Mechanical, Civil, Industrial, and Graphics. The first classes were held in temporary buildings on a corner of what is now the permanent campus site.

Permanent buildings were built in sequence with the Engineering and Business buildings coming last. As other divisions moved to the new facility, the Engineering Division expanded into vacated temporary buildings. While last in occupying a new facility, this process allowed experimentation with different laboratory arrangements and a more refined design for the permanent engineering building.

EARLY STAFFING

One of the unique features of Florissant Valley is that it started anew, free from past traditions and philosophy. While this had its disadvantages, it did allow freedom in developing new educational programs. The District President, Dr. Joseph Cosand, came from California and brought with him a tradition of that

educational system where many community colleges had non-ECPD but strong technical institute type programs integrated within a liberal arts setting. The first president of Florissant Valley, Dr. Douglas Libby, came from Wentworth Institute in Boston and brought with him the philosophy of eastern technical institute type education. The first chairman of the Engineering Division, Raymond J. Stith, came from the University of Dayton and brought experience with two and four year engineering technology programs. The first faculty were recruited from both industry and educational institutions. This original staff was brought in prior to the implementation of engineering-related programs.

INITIAL PROGRAMS

The initial programs were developed by this group with the assistance of a local advisory committee and educational consultant. Two publications were used as primary source documents: the recently written ASEE's "Characteristics of Excellence in Engineering Technology Education" and G. Ross Henninger's "The Technical Institute in America." Three program areas with a number of specific curricula were identified:

Engineering Science (ES)
Engineering Technology (ET)
  Architectural Engineering Technology
  Chemical Engineering Technology
  Civil Engineering Technology

Electrical Engineering Technology
Electronic Engineering Technology
Industrial Engineering Technology
Mechanical Engineering Technology
Industrial Technology (IT)
Electrical-Electronic Technology
Mecnanical Technology

The results of early planning included a pamphlet, "Careers in Engineering, Industrial Technologies, and Engineering Technologies." This publication was introduced at the ASEE meeting at the Illinois Institute of Technology in 1965. Dr. Libby made a presentation to a group then composed mostly of technical institute members. At that time, a lively discussion ensued about the capability of the community college to provide quality technical institute type of engineering technology programs.

PROBLEMS OF IMPLEMENTATION

With programs formulated through a heritage of diverse tradition, the central problem of implementation remained. One of the most severe and difficult problems was to understand the nature and differences of three forms of engineering-related education. It also became apparent that the traditional midwest had little knowledge of the new engineering technology programs and their relationship to the engineering personnel spectrum. It was necessary to develop a means of presenting these programs to interested groups.

What seemed to be happening was that the whole spectrum of engineering was expanding at an explosive rate. Figure 1 depicts this growth with the engineering spectrum reaching such proportions that it became impossible for one individual to become and remain competent in all areas. The division of labor that began many years ago became apparent.

EARLY MODEL

The graphical representation first used is shown in Figure 2. This was the only available model showing the mix of theory and skill for the areas of:

Science (S)
Engineering Science (ES)
Engineering Technology (ET)
Industrial Technology (IT)
Crafts (C)

SHIFT IN ENGINEERING EDUCATION

At the same time the Industrial spectrum was expanding, Engineering programs were moving towards a more science based curriculum (Fig. 3). Engineering schools sought to keep up with this expansion. Engineering programs were extended and some engineering schools went to five-year programs. Expansion occurred primarily in Math and Science courses. Towards the end of the 60's, however, many of the engineering schools were reducing

the number of credit hours required, perhaps in an effort to halt reducing enrollments. In their retreat the more skill oriented courses were deleted. Engineering and Industrial technology programs expanded throughout this period and by the end of 1970 the three classifications of programs became more identifiable.

ACCOUNTING FOR MOBILITY

While this model provided a means to explain the nature of these programs to local industry and students, it could not be used to answer such questions as mobility, growth, and location of technological personnel, such as: engineer-in-training, registered professional engineer, certificated engineering technician, as well as other positions within the spectrum. Figure 4 shows a model we constructed to demonstrate more fully the various areas within the technological spectrum. The five primary spectrum areas of S, ES, ET, IT, and C are defined graphically with the added dimension of mobility.

IDENTIFICATION OF POSITIONS

Figure 5 shows how this representation can be used to locate the apprentice, journeyman, and master craftsman. Also identifiable is the associate engineering technician, engineering technician, and senior engineering technician. With this model, the engineer-in-training and registered

professional engineer can be located. While definitions differed, this model represented fairly closely those definitions constructed by ASEE, NSPE, AND ECPD.

DISCIPLINARY REPRESENTATION

We also found, in discussing the nature of areas in the technical spectrum, that a different map was needed for different disciplines. Figure 6 indicates this as a series of planes representing various fields of activity.

MODEL FOR PLACEMENT

The model was also useful for demonstrating the need for different classes of individuals by local industry. While there has been some disagreement by industry about the name and definition of Engineering and Industrial Technology, the concept portrayed by the model has generally been accepted as representing the wide range of industrial need. Figure 7 shows a possible map for a research oriented firm, and Figure 8 shows the map of a production oriented firm.

COMPREHENSIVE COMMUNITY COLLEGE EDUCATION

The engineering related technological segment of the fully comprehensive community college is then identified as one that extends from science at one end of the spectrum to crafts on the other end; existing at less

than four year programs of education, but at a post-secondary level. Figure 9 shows this area overlayed on the personnel spectrum map.

MINIMUM THEORY LEVEL

We were also able to utilize the map to indicate the educational trend for minimum entry into a given disciplinary area.

ORGANIZATION

The administration of the comprehensive range of engineering-related areas has been integrated within the Engineering Division. Common laboratories are used for all programs. The requirement for comprehensiveness has in turn been specified for each departmental area within the division. This form of integrated administration of curricula has worked well with a fair balance between program areas. Of approximately 800 students pursuing engineering-related curricula, 30% are in Engineering Science, 61% are in Engineering Technology, and 9% are in the Industrial Technology.

Traditional community colleges where transfer oriented education has been predominant may not fare so well with such an organizational structure. Career or occupational education is sometimes placed under a separate technical dean to assure development in all technical areas. This has a disadvantage of dividing the faculty and student

body in segmented areas. Friction between the science or more academically oriented faculty and the technical faculty frequently develop. Also, using an integrated organization, activities can be conveniently provided to simulate team effort between Engineering Science, Engineering Technology, and Industrial Technology students. Further, this can be done prior to graduation rather than being left to a first job experience.

COUNSELING

In a relatively large organization a degree of centralization is necessary for initial counseling activity. In addition to providing varied student services, it is the job of the counselor to help the student understand various technical programs offered, such as:

Child Care
Accounting Technology
Marketing Technology
Nursing
Home Economics
Art
Engineering Related Technologies
Etc.

After the student has chosen a specific curriculum he is transferred to a faculty advisor in his specific area of interest. The faculty member has specific knowledge of curricula within that disciplinary area and also knows the scheduling patterns and prerequisites for the specific courses. His task as advisor then becomes one of guiding the student successfully through the program.

FACULTY

As enrollment increased, additional faculty members were added. Most of the faculty have an engineering background with a great deal of industrial experience both as Engineers and Technicians. While some specialization within ES, ET, and IT has occurred, most faculty are capable of and have taught in more than one area.

STUDENT PROFILE

The changing composition of our student population has posed new problems of implementation. The college has been in operation from 8 A.M to 10 P.M. and new pressure for evening and early morning courses indicate a need for extending these hours. Evening enrollment in the Engineering Division now accounts for approximately 40 percent of our students. Most day curricula have been extended into the evening. Planned course sequences through 1980 have been developed to allow evening students to start an Associate Degree curriculum at the beginning of each semester. A second factor causing new scheduling problems has developed because of the increased interest of the students in working while attending school. Over 90 percent of our students are working at least 10 hours per week.

SUMMARY

This presentation has been limited to some of the major and pressing problems of implementing engineering technology education in a comprehensive community college setting. Florissant Valley has used an integrated organization in this effort. The intention is to indicate how "we" developed in this direction to a workable solution and not to define an ideal model. Hopefully, some information presented may useful at your institution.

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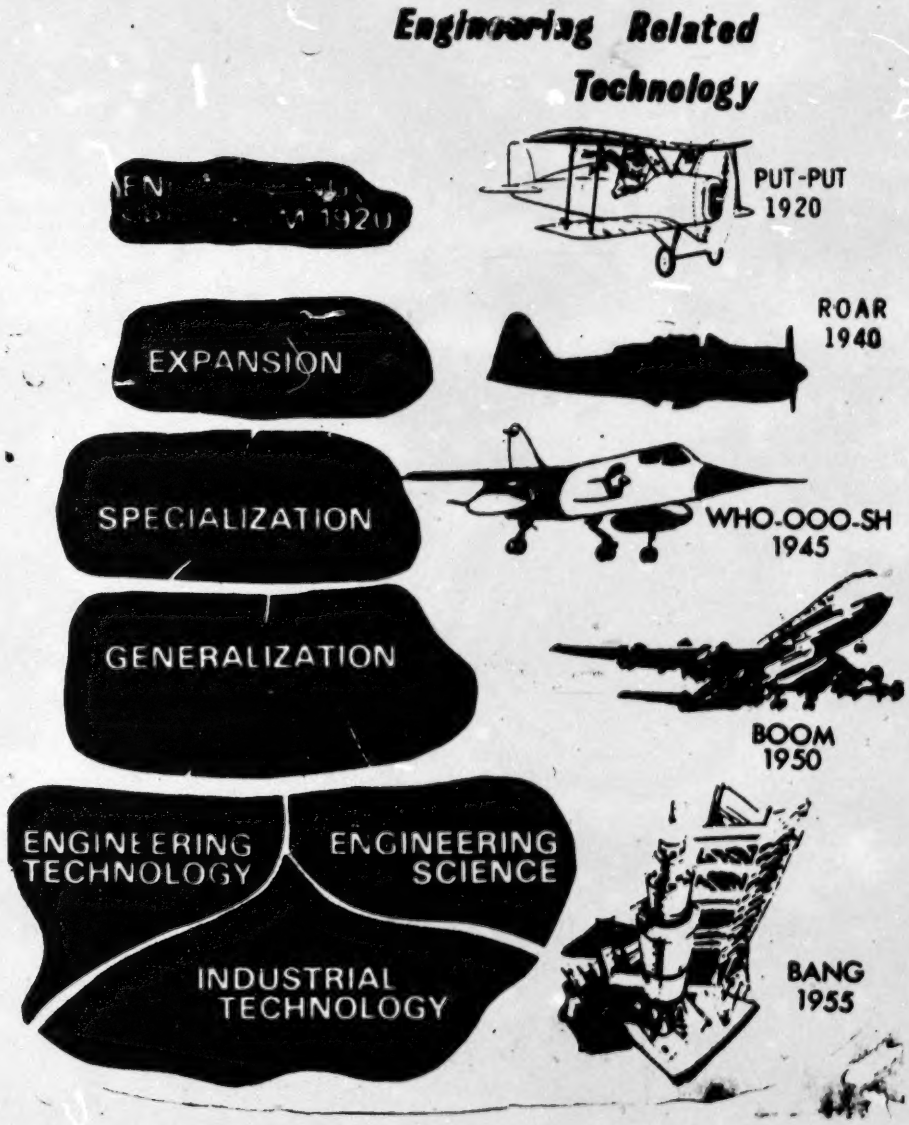
Engineering Related
Technology
PUT-PUT
1920
EXPANSION
ROAR
1940
SPECIALIZATION
WHO-OOO-SH
1945
GENERALIZATION
BOOM
1950
ENGINEERING
TECHNOLOGY
ENGINEERING
SCIENCE
INDUSTRIAL
TECHNOLOGY
BANG
1955

Figure 1

THEORY-SKILL MIX

(EARLY MODEL)

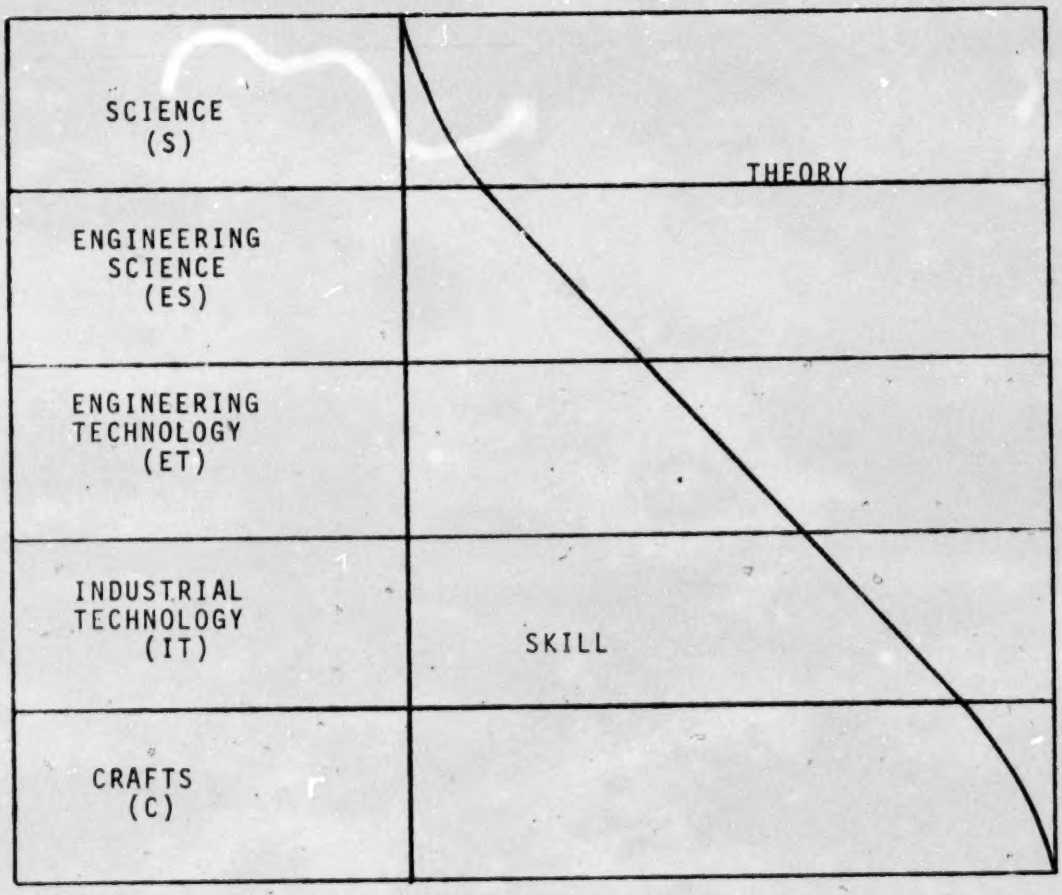

Figure 2

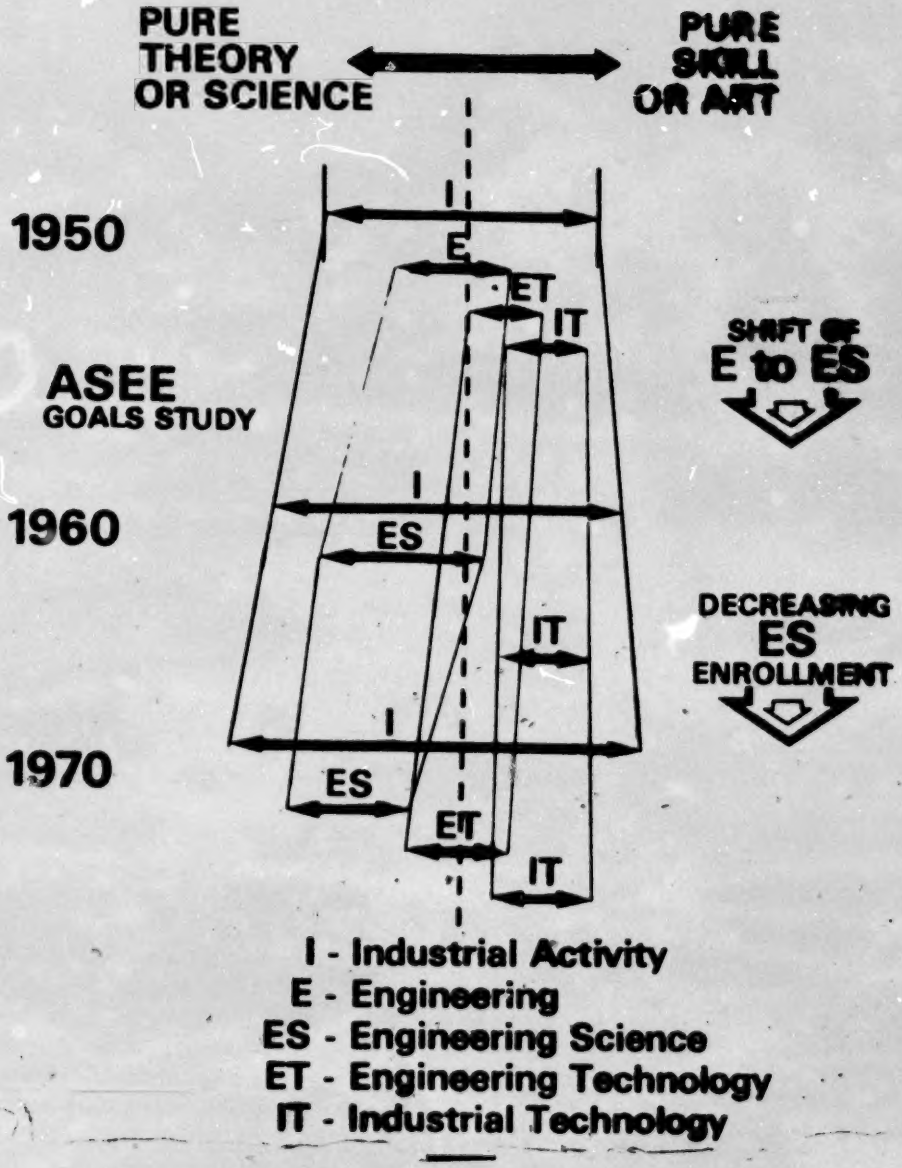
PURE
THEORY
OR SCIENCE
PURE
SKILL
OR ART
1950
E
ET
IT
ASEE
GOALS STUDY
SHIFT OF
E to ES
1960
ES
IT
DECREASING
ES
ENROLLMENT
1970
ES
ET
IT
I - Industrial Activity
E - Engineering
ES - Engineering Science
ET - Engineering Technology
IT - Industrial Technology

Figure 3

Technological Personnel Spectrum Map

THEORY - SKILL MIX

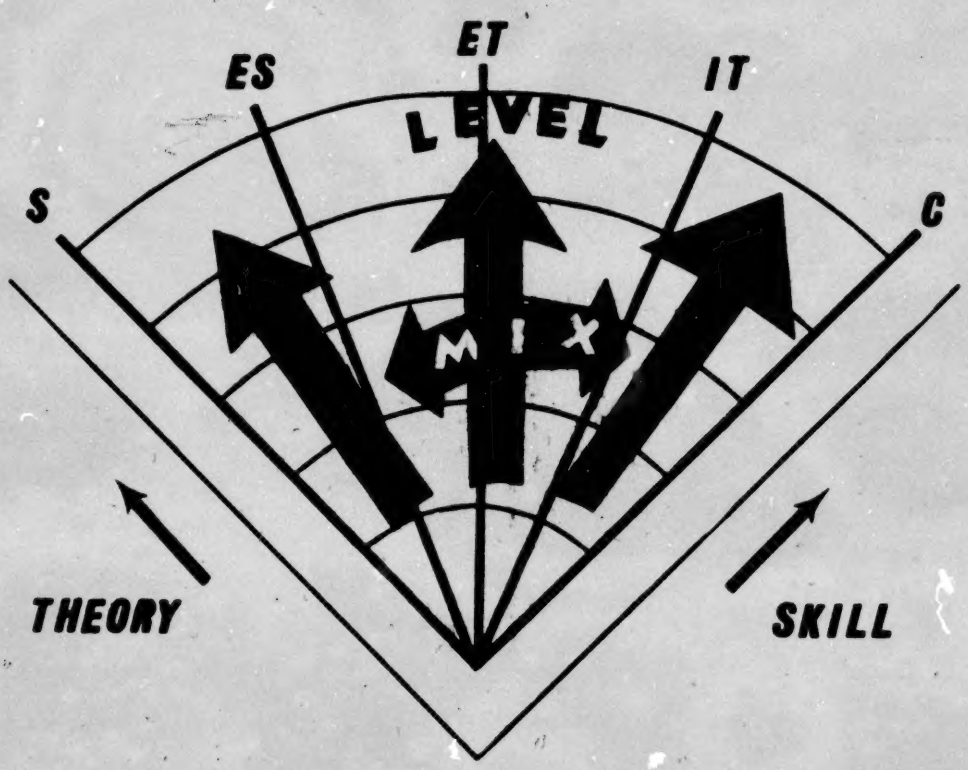

Figure 4

Technological Personnel Spectrum Map

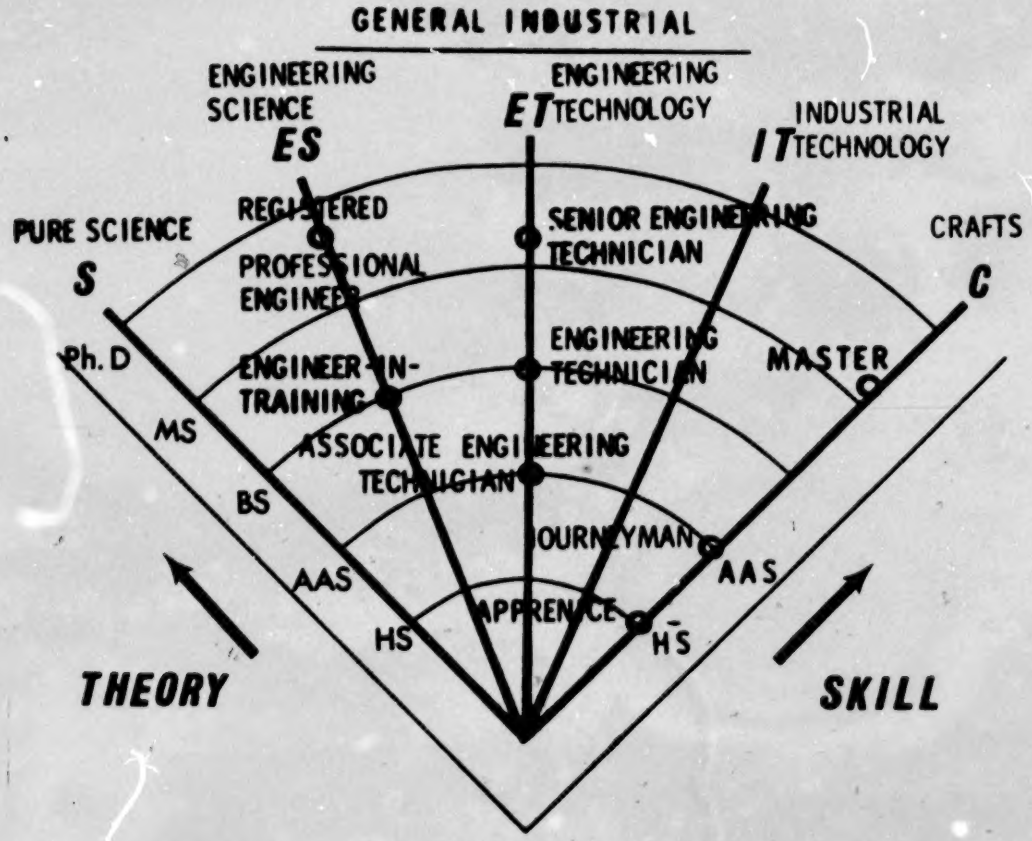

Figure 5

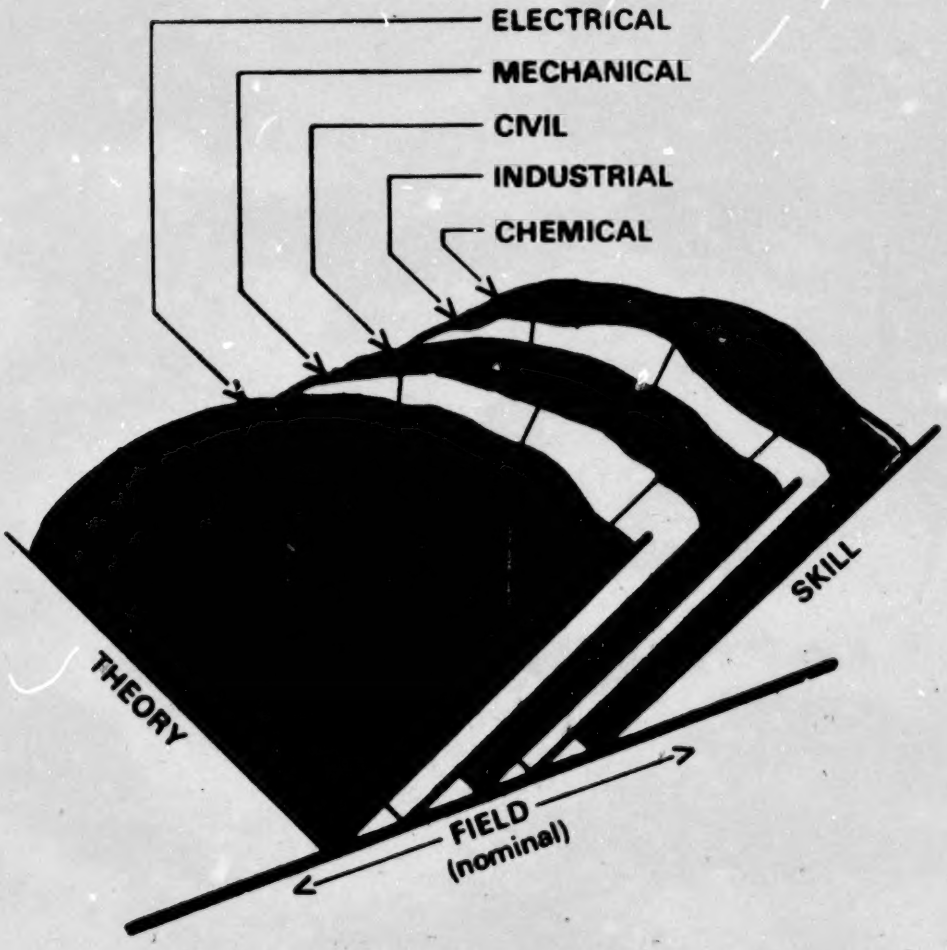
ELECTRICAL
MECHANICAL
CIVIL
INDUSTRIAL
CHEMICAL
SKILL
THEORY
FIELD
(nominal)

Figure 6

Technological Personnel Spectrum Map

RESEARCH ORENTIATED FIRM

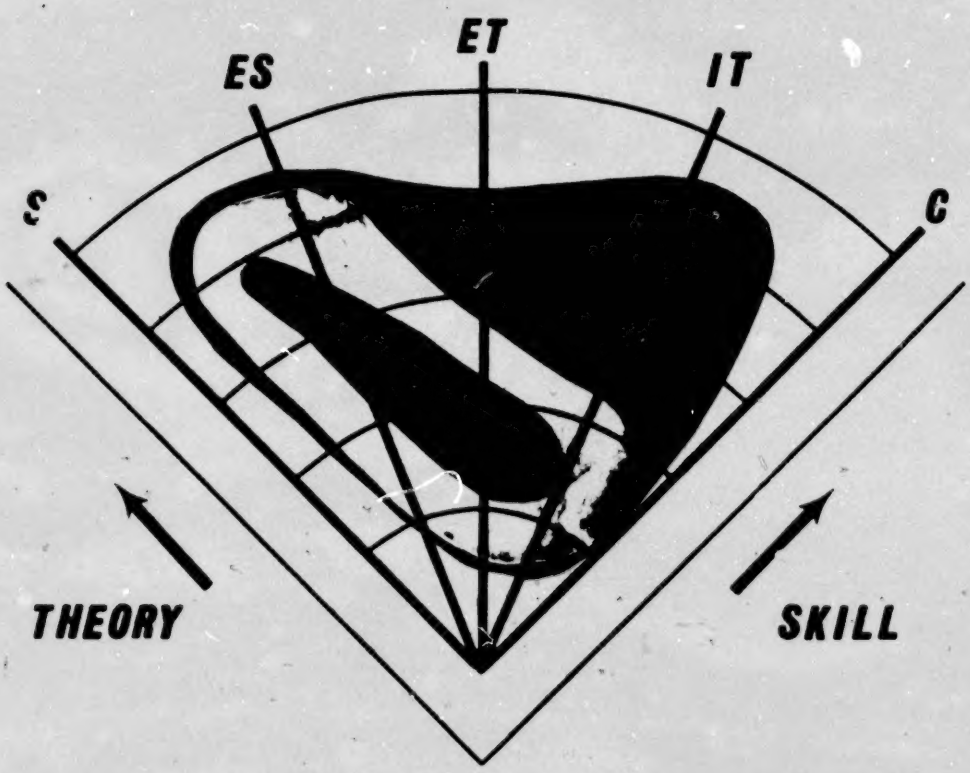

Figure 7

Technological Personnel Spectrum Map

PRODUCTION ORENTIATED FIRM

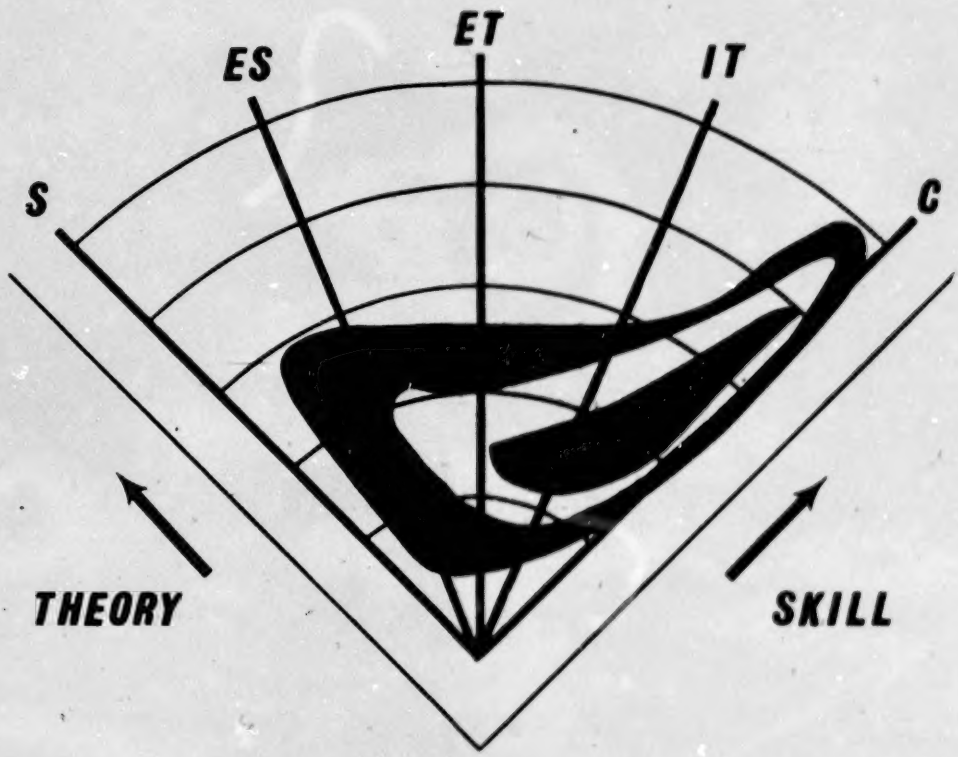

Figure 8

Technological Personnel Spectrum Map

COMPREHENSIVE COMMUNITY COLLEGE EDUCATION

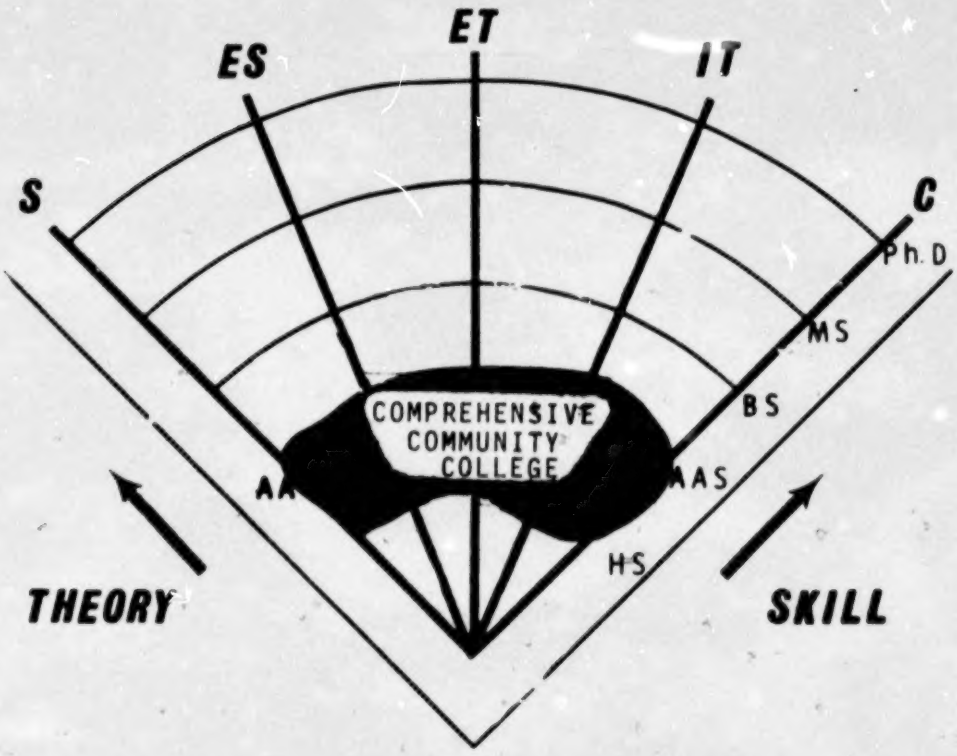

Figure 9

Technological Personnel Spectrum Map

MINIMUM ENTRY LEVEL

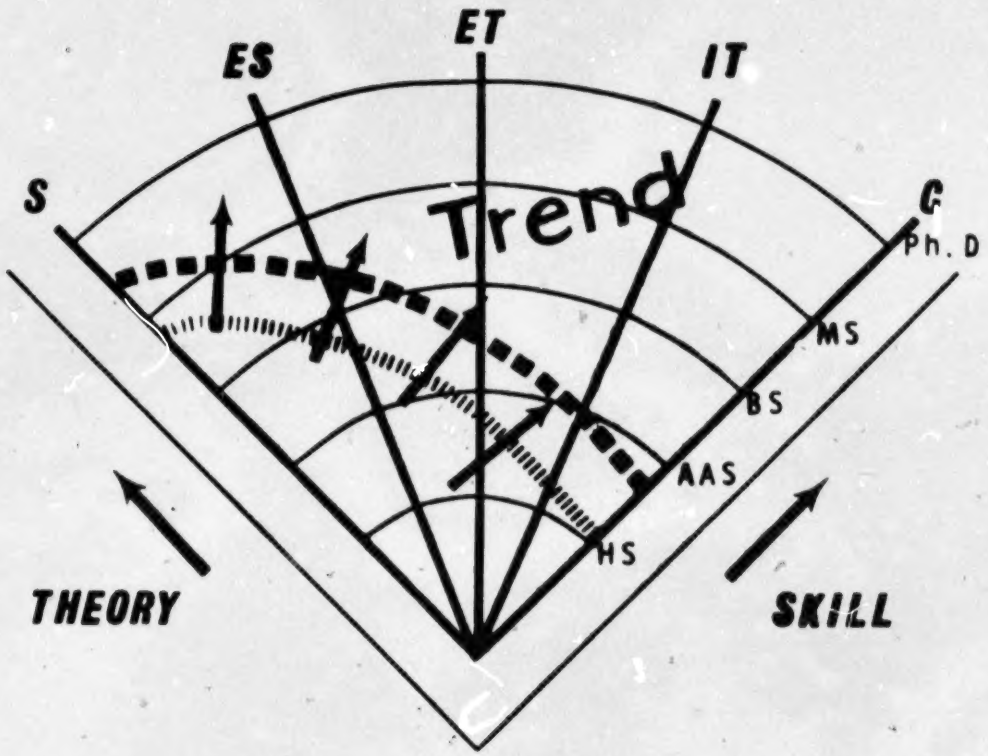

Figure 10